

**From:** [Sanchez, Carlos](#)  
**To:** [Khoury, Ghassan](#); [Villarreal, Chris](#); [Tzhone, Stephen](#)  
**Cc:** [Rauscher, Jon](#)  
**Subject:** RE: Arkwood Memorandum - Evaluation of Principal Threat Waste for Dioxin in Soil under 6" Soil Cover  
**Date:** Tuesday, June 09, 2015 3:10:15 PM

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Thanks Ghassan. I know they are totally different risks, I was just trying to get a better perspective from a technical/engineering stand point, something that I could understand. I still do not understand it, but that is why we have you guys (risk assessors) to provide to us the information to make a decision. CAS

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**From:** Khoury, Ghassan  
**Sent:** Tuesday, June 09, 2015 2:53 PM  
**To:** Sanchez, Carlos; Villarreal, Chris; Tzhone, Stephen  
**Cc:** Rauscher, Jon  
**Subject:** RE: Arkwood Memorandum - Evaluation of Principal Threat Waste for Dioxin in Soil under 6" Soil Cover

Carlos, the word equate is not the proper word to use here. It is the concentration of dioxin in soil. The same soil concentration you use to come up with a HQ and the same soil concentration one uses to come up with the cancer risk. So the soil concentration of 22,000 ppt for a commercial/industrial scenario reflects a cancer risk of  $1 \text{ E-}03$  (liver or other kind of cancer). The same soil concentration of 22,000 for a commercial/Industrial scenario reflects a HQ of 30 (impact fertility in young men). A cancer risk of  $1\text{E-}03$  is one order of magnitude greater than the upper end of acceptable cancer risk range  $1\text{E-}04$ . If we use the same logic of one order of magnitude higher than the acceptable level, then one order of magnitude greater than the acceptable level of a HQ  $\approx 1$  is a HQ of 10.

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**From:** Sanchez, Carlos  
**Sent:** Tuesday, June 09, 2015 1:02 PM  
**To:** Villarreal, Chris; Tzhone, Stephen  
**Cc:** Khoury, Ghassan; Rauscher, Jon  
**Subject:** RE: Arkwood Memorandum - Evaluation of Principal Threat Waste for Dioxin in Soil under 6" Soil Cover

Chris,  
One quick question.  
On the memo it was mentioned that a risk number of  $10^{-3}$  equates to a HQ of 10. So an HQ of 1 equates to  $10^{-4}$ ? I thought that an HQ of 1 equated to a  $10^{-6}$  cancer level? CAS

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**From:** Villarreal, Chris  
**Sent:** Tuesday, June 09, 2015 12:45 PM  
**To:** Sanchez, Carlos; Tzhone, Stephen



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**Cc:** Khoury, Ghassan; Rauscher, Jon

**Subject:** Arkwood Memorandum - Evaluation of Principal Threat Waste for Dioxin in Soil under 6"  
Soil Cover

Attached

Chris Villarreal

Chief, Risk and Site Assessment Section

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